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LAND RESOURCES: DESERTIFICATION AND DROUGHT

Text submitted by the Chairman on the basis of negotiations held on document A/CONF.151/PC/100/Add.17

Managing fragile ecosystems: combating desertification and drought (Section II, Chapter 4 of Agenda 21)

Attached is the text of A/CONF.151/PC/100/Add.17 as it has been agreed in negotiations on 9-11 March 1992. The paragraphs in the introduction, basis for action and means for implementation have not been negotiated: language on these points will be inserted later, based on the results of ongoing consideration of cross-sectoral issues.

The texts of paragraph 51 of this document and A/CONF.151/PC/100/Add.17, paragraph 13, are still under negotiation. They will be included in the revised text of this document as soon as possible.

INTRODUCTION

1. **(A/CONF.151/PC/WG.I/CRP.12/Rev.1, para. 11)< Fragile ecosystems are important ecosystems, with unique features and resources. Fragile ecosystems include deserts, semi-arid lands, mountains, wetlands, small islands, and certain coastal areas.>** This chapter addresses land resources issues in deserts and arid and semi-arid areas. The issue of mountains is addressed in the Agenda 21 chapter on Sustainable Mountain Development. 1/ The subject of small islands and coastal areas is presented in the Agenda 21 chapter on Oceans. 2/

2. **(A/CONF.151/PC/62, para. 5)< Desertification is land degradation in arid, semi-arid and dry sub-humid areas resulting from adverse human impact.>** Desertification affects about a sixth of the world's population, 70 per cent of the total drylands amounting to 3.6 billion hectares, and one quarter of the total land area of the world. The most obvious impact of desertification, in addition to widespread poverty, is the degradation of 3.3 billion hectares of the total area of rangelands, constituting 73 per cent of the rangelands which have low potential for human and animal carrying capacity; decline in soil fertility and soil structure on about 47 per cent of total area in the drylands which constitutes marginal rainfed croplands, and the degradation of irrigated croplands amounting to 30 per cent of the total area on drylands which have high population density and agricultural potential.

3. The first priority in combating desertification should be the implementation of preventive measures for lands that are not yet degraded, or which are only slightly degraded. This is recognized in the United Nations Plan of Action to Combat Desertification. In combating desertification and drought, the participation of local communities, rural organizations, national Governments, non-governmental organizations and international and regional organizations is essential.

4. Discussion on A/CONF.151/PC/WG.I/L.29 showed the national, regional and global nature of the desertification problem and the important developmental and environmental implications that need investigation and immediate action. There was broad agreement on the content of this document and the proposed programme areas for Agenda 21 which were annexed to the decision in A/CONF.151/PC/WG.I/L.36/Rev.1. This decision also requested a further elaboration of the proposed programme areas and action for consideration by the Preparatory Committee at its fourth session.

5. Programme areas in this chapter include:

A. Strengthening the knowledge base and developing information and monitoring systems of regions prone to desertification and drought as well as the economic and social aspects of these systems;

B. Combating land degradation through, inter alia, intensifying soil conservation, afforestation and reforestation activities;

C. Developing and strengthening integrated programmes for eradication of poverty and promotion of alternative livelihood systems in areas prone to desertification;

D. Developing and integrating comprehensive anti-desertification programmes into national development plans and national environmental planning;

E. Developing comprehensive drought preparedness and drought-relief schemes, including self-help arrangements, for drought-prone areas and designing programmes to cope with environmental refugees;

F. Encourage and promote popular participation and environmental education, focusing on desertification control and managing the effects of drought.

A. STRENGTHENING THE KNOWLEDGE BASE AND DEVELOPING INFORMATION AND MONITORING SYSTEMS OF REGIONS PRONE TO DESERTIFICATION AND DROUGHT AS WELL AS THE ECONOMIC AND SOCIAL ASPECTS OF THESE SYSTEMS

Basis for action

6. The global assessments of the status and rate of desertification conducted by the United Nations Environment Programme (UNEP) in 1977, 1984 and 1991 have revealed insufficient basic knowledge of human-induced desertification processes and their interactions between climate fluctuations and recurrent droughts in world drylands. The absence of an adequate world-wide monitoring system severely restricts the development and implementation of effective anti-desertification programmes. The capacity of existing international, regional and national institutions, particularly in developing countries, to generate and exchange relevant information is limited. An integrated and coordinated information and monitoring system based on advanced technology and embracing global, regional, national and local levels is essential for understanding the dynamics of desertification and drought processes. It is also important for developing adequate measures to deal with desertification and drought and improving the socio-economic conditions.

Objectives

7. Promote establishment and/or strengthening of national environmental information coordination centres which will act as focal points within Governments for sectoral ministries and provide necessary standardization and back-up services. Ensure also that national environmental information systems on desertification and drought are linked together through a networking at subregional, regional and interregional levels.

8. Strengthen regional and global monitoring networks, linked to the development of national monitoring systems for the observation of land degradation and desertification caused both by climate fluctuations and by human impact, and identify priority areas for action.

9. Establish a permanent system at both national and international levels for monitoring desertification/land degradation with the aim of improving living conditions in the affected areas.

Activities

Management-related

10. National Governments, in cooperation with the international community, should:

(a) Establish and/or strengthen environmental information systems at the national level;

(b) Strengthen national State, provincial/local assessment and ensure cooperation/networking between existing environmental information and monitoring systems such as EARTHWATCH, Sahara Sahel Observatory (SSO) etc.;

(c) Strengthen the capacity of national institutions to analyse environmental data so that ecological change can be monitored and environmental information obtained on a continuing basis at the national level.

Data and information

11. National Governments, in cooperation with relevant local, regional and international organizations, should undertake:

(a) Review and study the means for measuring the ecological, economic and social consequences of desertification and land degradation, and introduce internationally the results of these studies into the practice of desertification and land degradation assessment;

(b) Review and study the interactions between climate, drought and desertification socio-economic impacts, and utilize the results of these studies in order to get concrete actions.

12. National Governments, with the support of the international community, should:

(a) Support the integrated data collection and research work of programmes related to desertification and drought problems;

(b) Support national, regional and global programmes for integrated data collection and research networks, carrying out assessment of soil and land degradation;

(c) Strengthen national and regional meteorological and hydrological networks and monitoring systems to ensure adequate basic information collection and communication among national, regional and international centres.

International and regional cooperation and coordination

13. National Governments and the international community should strengthen regional programmes and international cooperation such as the Permanent Inter-state Committee on Drought Control in the Sahel (CILSS), the Intergovernmental Authority on Drought and Development (IGADD), the Southern African Development Coordination Conference (SADCC), Arab Maghreb Union (UMA) and other regional organizations, as well as organizations such as the Sahara and Sahel Observatory (OSS).

Means of implementation

Financing and cost-evaluation

14. The total financing required to implement this programme area is about US$ 350 million a year, while the average annual financing required from international sources is about US$ 175 million. From this international figure, the average annual costs related to accelerated development would be about US$ 165 million and the costs for strengthening the capacity of international institutions would be about US$ 10 million a year.

Scientific and technological means

15. National Governments, in cooperation with the international and regional organizations working on the issue of desertification and drought, should:

(a) Draw on existing inventories of natural resources, such as energy, water, soil, minerals, plant and animal access to food as well as other resources to food such as housing, employment, health, education and demographic distribution in time and space;

(b) Develop integrated information systems for environmental monitoring, accounting and impact assessment.

Human resource development

16. National Governments, in cooperation with the international and regional organizations working on the issue of desertification and drought, should develop technical and professional skills of people engaged in monitoring and assessment of the issue of desertification and drought.

Capacity-building

17. National Governments, in cooperation with the international and regional organizations working on the issue of desertification and drought, should strengthen national and local-level institutions by providing adequate staff equipment and finance to monitor and assess desertification.

B. COMBATING LAND DEGRADATION THROUGH, INTER ALIA, INTENSIFYING SOIL CONSERVATION, AFFORESTATION AND REFORESTATION ACTIVITIES

Basis for action

18. Desertification affects about 3.6 billion hectares, which is about 70 per cent of the total area of the world's drylands or nearly one quarter of the global land. The first priority is to protect and take preventive measures in areas which are not yet affected or only slightly affected by desertification. This includes more than 1.2 billion hectares of rangelands (about 27 per cent of the total area of rangelands), 240 million hectares of rainfed cropland (about 53 per cent of the total area of rainfed cropland) and 100 million hectares of irrigated cropland (about 70 per cent of the total irrigated land). The second priority would involve implementation of corrective measures to sustain the productivity of moderately desertified drylands. This includes about 1,250 million hectares of rangelands (about 28 per cent of the total area of rangelands), 180 million hectares of rainfed cropland (about 40 per cent of the total area of rainfed cropland) and 35 million hectares of irrigated cropland (about 23 per cent of the total irrigated area). The third priority would consist of rehabilitation or protection for natural recovery of severely or very severely desertified drylands. These include over 2 billion hectares of rangelands, 33 million hectares of rainfed cropland and 9 million hectares of irrigated cropland.

19. An increasing vegetation cover would promote and stabilize the hydrological balance in the dryland areas and maintain land quality and land productivity. Prevention of not yet degraded land and application of corrective measures and rehabilitation of moderate and severely degraded drylands through the introduction of environmentally sound, socially acceptable and fair, and economically feasible land use systems. This will enhance the land carrying capacity and maintenance of biotic resources in fragile ecosystems.

Objectives

20. As regards areas not yet affected or only slightly affected by desertification, appropriate management of existing natural formations (including forests), for the conservation of biodiversity, watershed protection, sustainability of their production and agricultural development, and other purposes with full participation of indigenous people.

21. Rehabilitate moderately to severely desertified drylands for productive utilization and sustain their productivity for agropastoral/agro-forestry development through, inter alia, soil and water conservation.

22. Increase the vegetation cover and support management of biotic resources in regions affected or prone to desertification and drought notably through activities such as afforestation/reforestation, agro-forestry and community forestry and vegetation retention schemes.

23. Improve management of forest resources, including woodfuel. Reduce woodfuel consumption through more efficient utilization and conservation as well as enhancement and development and use of other sources of energy, including alternative sources of energy.

Activities

Management-related

24. National Governments, with the support of the international community, should:

(a) Implement urgent direct preventive measures in so-far non-affected but vulnerable or only slightly desertified drylands, by introducing (i) improved land use policies and practices for increased sustainable land productivity; (ii) appropriate, environmentally sound and economically feasible agricultural and pastoral technologies, and (iii) improved management of soil and water resources;

(b) Carry out accelerated afforestation and reforestation programmes, using drought-resistant, fast-growing species, in particular native ones, including legumes and other species, combined with community-based agro-forestry schemes. In this regard, creation of large-scale reforestation and afforestation schemes particularly through establishment of green belts should be considered, bearing in mind such measures could increase CO_2 sinks;

(c) Implement urgent direct corrective measures in moderately to severely desertified drylands in addition to the measures listed in (a) above, with a view to restoring and sustaining their productivity;

(d) Promote improved land/water/crop management systems making it possible to combat salinization in existing irrigated croplands. Stabilize rainfed croplands and introduce improved soil/crop management systems into land use practice;

(e) Promote participatory management of natural resources, including rangelands, to meet both the needs of the rural populations and conservation purposes, based on innovative or adapted indigenous technologies;

(f) Promote *in situ* protection and conservation of special ecological areas through legislation and other means for purposes of combating desertification, while ensuring the protection of biodiversity;

(g) Promote and encourage investment in forestry development in drylands through various incentives, including legislative measures;

(h) Promote the development and use of other sources of energy, including alternative sources of energy and improved stoves to lessen pressure on ligneous resources.

Data and information

25. National Governments should:

(a) Develop land-use models based on local practices for the improvement of local practices, with a focus on preventing land degradation. The models should give a better understanding of the variety of natural and human-induced factors that may contribute to desertification. Models should incorporate the interaction of new as well as traditional practices to prevent land degradation and reflect the resilience of the whole ecological and social system;

(b) Develop, test and introduce with due regard to environmental security considerations drought resistance, fast growing and productive plant species appropriate to the environment of regions concerned.

International and regional cooperation and coordination

26. The appropriate United Nations agencies, international organizations, non-governmental organizations, and bilateral agencies should:

(a) Coordinate their role in combating land degradation and promoting reforestation, agro-forestry and land management systems in affected countries;

(b) Support regional and subregional activities in technology development and dissemination, training and programme implementation to arrest dryland degradation.

27. The national Governments concerned, the appropriate United Nations agencies, and bilateral agencies should strengthen the coordinating role in dryland degradation of subregional intergovernmental organizations set up to cover these activities, e.g., CILSS, IGADD, SADCC and UMA.

Means of implementation

Financing and cost-evaluation

28. The total financing required to implement this programme area in developing countries is about US$ 6 billion a year, while the average annual financing required from international sources is about US$ 3 billion. From this international figure, costs related to accelerated development would be about US$ 2.6 billion a year, the requirements for global environmental issues would be about US$ 370 million a year, and the amount for strengthening the capacity of international institutions would be about US$ 30 million a year.

Scientific and technological means

29. National Governments and local communities should:

(a) Integrate indigenous knowledge related to forests, forest lands, rangelands and natural vegetation into research activities on desertification and drought;

(b) Promote integrated research programmes on protection, restoration and conservation of water and land resources and land-use management based on traditional approaches, where feasible.

Human resource development

30. National Governments and local communities should:

(a) Establish mechanisms which ensure that land users, both women and men, are the main actors in implementing improved land use, including agro-forestry systems, in combating land degradation;

(b) Strengthen existing extension services in areas prone to desertification and drought, particularly for training of farmers and pastoralists on improved management of land and water resources in dry land.

Capacity-building

31. National Governments and local communities should:

(a) Develop and adopt, through appropriate national legislation, and introduce institutionally, new and environmentally sound development-oriented land-use policies;

(b) Support community-based people's organizations, especially farmers and pastoralists.

C. DEVELOPING AND STRENGTHENING INTEGRATED PROGRAMMES FOR ERADICATION OF POVERTY AND PROMOTION OF ALTERNATIVE LIVELIHOOD SYSTEMS IN AREAS PRONE TO DESERTIFICATION

Basis for action

32. Current livelihood and resource use systems are not able to maintain living standards in areas prone to desertification and drought and the growing population is increasing the pressure on the resource base. Poverty is a major factor in accelerating the rate of degradation and desertification. In many of the marginal drylands, the existing livelihood system, based largely on subsistence agriculture and livestock, are inadequate to be used on a sustainable basis. Measures listed in programme areas A, B, D and E will help but they should be complemented by additional social, political and economic

national actions directed at alleviating poverty, generating alternative livelihoods, adjusting existing land tenure, promoting small-scale enterprises in rural areas and adjusting demographic policies.

Objectives

33. Create the capacity of village communities and pastoral groups to take charge of their development and the management of their land resources on a socially equitable and ecologically sound basis.

34. Improve production systems in order to achieve greater productivity within approved conservation of national resources in the framework of an integrated approach to rural development.

35. Provide opportunity for alternative livelihood as a basis for reducing pressure on land resources and at the same time provide additional resources of income, particularly for the rural population, thereby improving their standard of living.

Activities

Management-related

36. National Governments, with the support of the international community, should:

(a) Adopt policies at the national level regarding a decentralized approach to land resource management, delegating responsibility to rural organizations;

(b) Create or strengthen rural organizations in charge of village and pastoral land management;

(c) Establish and develop local, national and intersectoral mechanisms to handle environmental and developmental consequences of land tenure expressed in terms of land use and land ownership. Particular attention should be given to protecting the property rights of women and pastoral and nomadic groups living in rural areas;

(d) Create or strengthen village associations focused on economic activities of common pastoral interest (market gardening, transformation of agricultural products, livestock, herding, etc.);

(e) Promote rural credit and mobilization of rural savings through the establishment of rural banking systems;

(f) Develop infrastructure, and local production and marketing capacity, by involving the local people to promote alternative livelihood systems and alleviate poverty;

(g) Establish a revolving fund for credit to rural entrepreneurs and local groups, to facilitate establishment of cottage industries/business ventures and credit for input to agro-pastoral activities.

Data and information

37. National Governments, with the support of the international community, should:

(a) Conduct socio-economic baseline studies in order to have a good understanding of the situation in the programme area regarding, particularly, resource and land tenure issues, traditional ways of land management and characteristics of productions systems;

(b) Conduct inventory of natural resources (soil, water and vegetation) and their state of degradation, based primarily on the knowledge of the local population (e.g., rapid rural appraisal);

(c) Disseminate information on technical packages adapted to the social and economical and ecological conditions of each;

(d) Promote exchange and sharing of information concerning development of alternative livelihoods with other agro-ecological regions.

International and regional cooperation and coordination

38. National Governments, with the support of the international community, should:

(a) Promote cooperation and exchange of information among the arid and semi-arid land research institutions concerning techniques and technologies to improve land and labour productivity as well as viable production systems;

(b) Coordinate and harmonize the implementation of programmes and projects funded by the international organization communities and non-governmental organizations that are directed towards the alleviation of poverty and promotion of an alternative livelihood system.

Means of implementation

Financing and cost-evaluation

39. The total financing required for these programme areas is about US$ 3 billion a year, while the average annual financing required from international sources is about US$ 1.5 billion.

Scientific and technological means

40. National Governments, with the support of the international community, should:

(a) Undertake applied research in land-use with the support of local research institutions;

(b) Facilitate regular national regional and interregional communication and exchange on information and experience between extension officers and researchers;

(c) Support and encourage introduction and use of technologies for the generation of alternative sources of incomes.

Human resource development

41. National Governments, with the support of the international community, should:

(a) Train members of rural organizations in management skills and agro-pastoralists in special techniques such as soil and water conservation, water harvesting, agro-forestry, small-scale irrigation;

(b) Train extension agents and officers in the participatory approach to integrated land management.

Capacity-building

42. National Governments should establish and maintain mechanisms to ensure integration of strategies into sectoral and national development plans and programmes for poverty alleviation among the inhabitants of lands prone to desertification.

D. DEVELOPING AND INTEGRATING COMPREHENSIVE ANTI-DESERTIFICATION PROGRAMMES INTO NATIONAL DEVELOPMENT PLANS AND NATIONAL ENVIRONMENTAL PLANNING

Basis for action

43. In a number of developing countries affected by desertification the natural resource base is the main resource upon which the development process must rely. The social systems interacting with land resources make the problem much more complex, requiring an integrated approach to planning and management of land resources. Anti-desertification and drought action plans should be integrated to include management of the environment and development aspects as well, thus fitting into the approach of integrated national development plans and national environmental action plans.

Objectives

44. Strengthen national institutional capabilities to develop appropriate anti-desertification programmes and to integrate them into national development planning.

45. Develop and integrate strategic planning frameworks for the development, protection and management of natural resources in dryland areas into national development plans, including national plans to combat desertification, and environmental action plans in countries most prone to desertification.

46. Initiate a long-term process for implementing and monitoring of strategies related to natural resources management.›

47. Strengthen regional and international cooperation for combating desertification [through, inter alia, the adoption of legal and other instruments].

Activities

Management-related

48. National Governments should:

(a) Establish or strengthen, national and local anti-desertification authorities within government and local executive bodies, as well as local land-users committees/associations, in all rural communities affected, with a view to organizing working cooperation between all actors concerned, from the grass-roots level of farmers/pastoralists through to the higher levels of Government;

(b) Develop national plans of action to combat desertification and incorporate them, as appropriate, as integrated parts of national development plans and national environmental action plans;

(c) Implement policies directed to the improvement of land use, the appropriate management of common lands, the provision of incentives to small farmers and pastoralists, the involvement of women, and to the encouragement of private investment in the development of drylands;

(d) Ensure coordination among ministries and institutions working on anti-desertification programmes at national and local levels.

Data and information

49. National Governments should promote information exchange and cooperation with respect to national planning and programming among affected countries, inter alia, through networking.

International and regional cooperation and coordination

50. The relevant international organizations, multilateral financial institutions, non-governmental organizations and bilateral agencies should strengthen their cooperation in assisting the preparation and integration of anti-desertification control programmes into national planning strategies, the establishment of national coordinating and monitoring mechanisms and the regional and global networking of these plans and mechanisms.

51.

Means of implementation

Financing and cost-evaluation

52. The total financing required to implement this programme area is about US$ 180 million a year, while the average annual financing required from international sources is about US$ 90 million. From this international figure, costs related to accelerated development would be about US$ 80 million a year, and the costs for strengthening the capacity of international institutions would be about US$ 10 million a year.

Scientific and technological means

53. National Governments, in cooperation with appropriate international and regional organizations, should:

(a) Develop and introduce appropriate improved sustainable agricultural and pastoral technologies that are socially and environmentally acceptable and economically feasible;

(b) Undertake applied study of integrating environmental and developmental activities into national development plans.

Human resource development

54. National Governments should undertake nation-wide major anti-desertification awareness/training campaigns within countries affected through existing national mass media facilities, educational networks and newly created or strengthened extension services. This should ensure people's access to knowledge of desertification and drought and to national Plans of Action to Combat Desertification.

Capacity-building

55. National Governments should establish and maintain mechanisms to ensure coordination of sectoral ministries and institutions, including local-level institutions and appropriate non-governmental organizations, in integrating anti-desertification programmes into National Development Plans and National Environmental Action Plans.

E. DEVELOPING COMPREHENSIVE DROUGHT PREPAREDNESS AND DROUGHT-RELIEF SCHEMES, INCLUDING SELF-HELP ARRANGEMENTS, FOR DROUGHT-PRONE AREAS AND DESIGNING PROGRAMMES TO COPE WITH ENVIRONMENTAL REFUGEES

Basis for action

56. Drought, in differing degrees of frequency and severity, is a recurring phenomenon throughout much of the developing world, especially Africa. Apart from the human toll - an estimated 3 million people died in the mid-1980s because of drought in sub-Saharan Africa - the economic costs of drought-related disasters is also high in terms of lost production, misused inputs and diversion of development resources.

57. Early warning systems to forecast drought will make possible the implementation of drought-preparedness schemes. Integrated packages at the farm and watershed level, such as alternative cropping strategies, soil and water conservation and promotion of water harvesting techniques, could enhance the land capacity to cope with drought and provide basic necessities, thereby minimizing the number of environmental refugees and the need for emergency drought relief. At the same time, contingency arrangements for relief are needed for periods of acute scarcity.

Objectives

58. Develop national strategies for drought preparedness in the short- and long-term perspectives aimed at reducing vulnerability of production systems to drought.

59. Strengthen the flow of early warning information to decision makers and land users, to enable nations to implement strategies for drought interventions.

60. Develop and integrate drought-relief schemes and means to cope with environmental refugees into national and regional development planning.

Activities

Management-related

61. In drought-prone areas, national Governments should:

(a) Design strategies to deal with national food deficiencies in periods of production shortfall - these should deal with issues of storage and stocks, imports, port facilities, food storage, transport and distribution;

(b) Improve national and regional capacity for agro-meteorology and contingency crop planning - agro-meteorology links the frequency, content and regional coverage of weather forecasts with the requirements of crop planning and agricultural extension;

(c) Prepare rural projects for providing short-term rural employment to drought-affected households - the loss of income and entitlement to food is a common source of distress in times of drought and rural works help to generate the income required to buy food for poor households;

(d) Establish contingency arrangements, where necessary, for food/fodder distribution and water supply;

(e) Establish budgetary mechanisms for providing resources at short notice for drought relief;

(f) Establish safety nets for the most vulnerable households.

Data and information

62. National Governments of affected countries should:

(a) Implement research on seasonal forecasts to improve contingency planning and relief operations and allow preventive measures to be taken at the farm level, such as selection of appropriate varieties and farming practices, in times of drought;

(b) Support applied research on ways of reducing water loss from soils, on increasing water absorption capacities of soils and on water harvesting techniques in drought-prone areas;

(c) Strengthen national early warning systems, with particular emphasis on the area of risk-mapping, remote sensing, agro-meteorological modelling, integrated multidisciplinary crop-forecasting techniques and computerized food supply/demand analysis.

International and regional cooperation and coordination

63. National Governments, in cooperation with the appropriate intergovernmental organizations, should:

(a) Establish a system of stand-by capacities in terms of foodstock, logistical support, personnel and finance for quick international response to drought-related emergencies;

(b) Support WMO Programmes on Agro-Hydrology and Meteorology (AGRHIMET) and the African Centre for Meteorological Application for Development (ACMAD) as well as the efforts of CILSS and IGADD;

(c) Support FAO's and other programmes for the development of national early warning systems and food security assistance schemes;

(d) Strengthen and expand the scope of existing regional programmes, the activities of appropriate United Nations agencies such as WFP, UNDRO and UNSO, as well as non-governmental organizations, aimed at mitigating the effects of drought and emergencies.

Means of implementation

Financing and cost-evaluation

64. This programme area requires two sets of cost evaluations. The first set deals with developing drought preparedness and drought-relief schemes, the total cost of which is about US$ 200 million a year, with the average annual financing required from international sources amounting to about US$ 100 million. From this international figure, costs related to accelerated development would be about US$ 90 million a year and the amount for strengthening the capacity of international institutions would be about US$ 10 million a year. The second set deals with the cost required to cope with environmental refugees displaced from their homes by emergencies such as drought, disasters and other environmental reasons. The international financing required to cope with such emergencies is about US$ 1 billion a year.

Scientific and technological means

65. National Governments and drought-prone communities should:

(a) Use traditional mechanisms to cope with hunger as a means of channelling relief and development assistance;

(b) Strengthen and develop national, regional and local interdisciplinary research and training capabilities for drought-prevention strategies.

Human resource development

66. National Governments should:

(a) Promote training of decision makers and land users in the effective utilization of early warning system information;

(b) Strengthen research and national training capabilities to assess the impact of drought and to develop methodologies to forecast drought.

Capacity-building

67. National Governments should:

(a) Improve and maintain mechanisms with adequate staff, equipment and finances for monitoring drought parameters to take preventive measures at regional, national and local levels;

(b) Establish interministerial linkages and coordinating units for drought monitoring, impact assessment and management of drought-relief schemes.

F. ENCOURAGE AND PROMOTE POPULAR PARTICIPATION AND ENVIRONMENTAL EDUCATION, FOCUSING ON DESERTIFICATION CONTROL AND MANAGING THE EFFECTS OF DROUGHT

Basis for action

68. The experience to date on the successes and failures of programmes and projects points to the need for popular support to sustain desertification and drought-control activities. But it is necessary to go beyond the theoretical ideal of popular participation and to focus on obtaining actual active popular involvement, rooted in the concept of partnership. This implies the sharing of responsibilities and mutual involvement of all parties. In this context, this programme area should be considered as an essential supporting component of all desertification-control and drought-related activities.

Objectives

69. Develop and increase public awareness and increased knowledge concerning desertification and drought, including integration of environmental education in the curricula of primary and secondary schools.

70. Establish and promote true partnership between government authorities, both at the national and local levels, other executing agencies, non-governmental organizations and land users stricken by drought and desertification, giving land users a responsible role in the planning and execution processes in order to benefit fully from development projects.

71. Ensure that the partners understand one another's needs, objectives and points of view by providing a variety of means such as training, public awareness, open dialogue etc.

72. Support local communities in their own efforts in combating desertification and draw on the knowledge and experience of concerned populations ensuring the full participation of women and indigenous population.

Activities

Management-related

73. National Governments, with the support of the international community, should:

(a) Adopt policies and establish administrative structures for more decentralized decision-making and implementation;

(b) Establish and utilize mechanisms for the consultation and involvement of land users and enhancing grass-roots-level capability to identify and/or contribute to identification and planning of actions;

(c) Define specific programmes/projects objectives in cooperation with local communities. Design local management plans to include such measures of progress, thereby providing a means to alter project design or change management practices, as appropriate;

(d) Introduce legislative, institutional/organizational and financial measures to secure user involvement and access to land resources;

(e) Establish and/or expand favourable conditions for the provisions of services, such as credit facilities and marketing outlets for rural populations;

(f) Develop training programmes to increase the level of education and participation of people, particularly women and indigenous groups, through, inter alia, literacy and development of technical skills;

(g) Create rural banking systems to facilitate access by rural populations, particularly women and indigenous groups, to credit and also to promote rural savings;

(h) Adopt appropriate policies to stimulate private and public investment.

Data and information

74. National Governments should:

(a) Review, develop and disseminate gender-desegregated information, skills, and know-how at all levels on how to organize and promote popular participation;

(b) Accelerate the development of technological know-how, focusing on appropriate and intermediate technology;

(c) Disseminate knowledge about applied research results on soil and water issues, appropriate species, agricultural techniques and technological know-how.

International and regional cooperation and coordination

75. National Governments, with the support of the international community, should:

(a) Develop programmes of support to regional organizations such as CILSS, IGADD, SADCC, UMA and other intergovernmental organizations in Africa and other parts of the world, to strengthen outreach programmes and increase participation of non-governmental organizations together with rural populations;

(b) Develop mechanisms for facilitating technology cooperation and promote it as an element of all external assistance and activities of public or private sector technical assistance projects;

(c) Promote collaboration among different actors in environment and development programmes;

(d) Encourage the emergence of representative organizational structures to foster and sustain interorganizational cooperation.

Means of implementation

Financing and cost-evaluation

76. The total financing required for this programme area is about US$ 2.5 billion a year, while the average annual financing required from international sources is about US$ 1 billion.

Scientific and technological means

77. National Governments, with the support of the international community, should promote the development of indigenous know-how and technology transfer.

Human resource development

78. National Governments, with the support of the international community, should:

(a) Support and/or strengthen institutions involved in public education, including the local media, schools and community groups;

(b) Increase the level of public education.

Capacity-building

79. National Governments should promote local rural organization members and train and appoint more extension officers working at the local level.

Notes

1/ Section II, Chapter 6, Managing Fragile Ecosystems: Sustainable Mountain Development.

2/ Section II, Chapter 9, Programme Areas A and G: "Integrated Management and Sustainable Development of Coastal Areas, Exclusive Economic Zones and [Marine Ecosystems]" and "Sustainable Development of Islands", respectively.

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LAND RESOURCES: SOIL LOSS

Text submitted by the Chairman on the basis of negotiations held on document A/CONF.151/PC/100/Add.18

Managing fragile ecosystems: sustainable mountain development (Section II, Chapter 5 of Agenda 21)

Attached is the text of document A/CONF.151/PC/100/Add.18 as it has been agreed in negotiations on 12 March 1992. The paragraphs in the introduction, basis for action and means for implementation have not been negotiated: language on these points will be inserted later, based on the results of ongoing consideration of cross-sectoral issues.

INTRODUCTION

1. Mountains are an important source of water, energy and biological diversity. Furthermore they are a source of key resources such as water, minerals, forest products, agricultural products and recreation. As a major ecosystem representing the complex and interrelated ecology of our planet, mountain environments are essential to the survival of the global ecosystem. Mountain ecosystems are, however, rapidly changing. They are susceptible to accelerated soil erosion, landslides and rapid loss of habitat and genetic diversity. On the human side, there is widespread poverty among mountain inhabitants and loss of indigenous knowledge. As a result, most global mountain areas are experiencing environmental degradation. Hence, the proper management of mountain resources and socio-economic development of the people deserves immediate action.

2. About 10 per cent of the world's population depends on mountain resources. A much larger percentage draws on other mountain resources, including and especially water. Mountains are a storehouse of biological diversity and endangered species.

3. Recognizing the interplay of ecological and developmental factors, the Preparatory Committee for the UNCED at its third session requested the Secretary-General of the United Nations Conference on Environment and Development to further elaborate the problem of fragile ecosystems and develop separate programmes with regard to all the mountains of the world (A/CONF.151/PC/WG.I/L.34/Rev.1). In view of this decision two programme areas are proposed as follows:

A. Generating and strengthening knowledge about the ecology and sustainable development of mountain ecosystems

B. Promoting integrated watershed development and alternative livelihood opportunities

PROGRAMME AREAS

A. GENERATING AND STRENGTHENING KNOWLEDGE ABOUT THE ECOLOGY AND SUSTAINABLE DEVELOPMENT OF MOUNTAIN ECOSYSYTEMS

Basis for action

4. Mountains are highly vulnerable to human and natural ecological imbalance. Mountains are the most sensitive areas to all climatic changes in the atmosphere. Specific information on ecology, natural resource potential and socio-economic activities is essential. Mountain and hillside areas hold a rich variety of ecological systems. Because of their vertical dimensions, mountains create gradients of temperature, precipitation and insolation. A given mountain slope may include several climatic regimes such as tropics, subtropics, temperate and alpine, each of which represents microcosms of larger habitat diversity. There is, however, a lack of knowledge of mountain ecosystems. The creation, therefore, of a global mountain database is vital for launching programmes that would contribute to sustainable development of mountain ecosystems.

Objectives

5. Undertake a survey of the different forms of soils, forest, water use, crop, plant and animal resources of mountain ecosystems, taking into account the work of existing international and regional organizations.

6. Maintain and generate database and information systems to facilitate the integrated management and environmental assessment of mountain ecosystems, taking into account the work of existing international and regional organization.

7. Improve and build the existing land/water ecological knowledge base regarding technologies and agricultural and conservation practices in the mountain regions of the world with the participation of local communities.

8. Create and strengthen the communications network and information clearing-house for existing organizations concerned with mountain issues.

9. Improve coordination of regional efforts to protect fragile mountain ecosystems through the consideration of appropriate mechanisms, including regional legal and other instruments.

10. Generate information to establish database and information systems to facilitate an evaluation of environmental risks and of natural disaster in mountain ecosystems.

Activities

Management-related:

11. National Governments with the supports of the relevant international organizations should:

(a) Strengthen existing institutions or establish new ones at local, national and regional levels to generate a multidisciplinary land/water ecological knowledge base on mountain ecosystems;

(b) Promote national policies that would provide incentives to local people for the use and transfer of environment-friendly technologies as well as farming and conservation practices;

(c) Build up the knowledge base and understanding by creating mechanisms for cooperation and information exchange among national and regional institutions working on fragile ecosystems;

(d) Encourage policies that would provide incentives to farmers and local people to undertake conservation and regenerative measures;

(e) Diversify mountain economies including creating and/or strengthening of tourism in accordance with integrated management of mountain areas;

(f) Integrate all forest, rangelands and wildlife activities in such a way that specific mountain ecosystems are maintained;

(g) Establish appropriate natural reserves in representative species-rich sites and areas.

Data and information:

12. National Governments with the support of relevant international organizations should:

(a) Maintain and establish meteorological, hydrological and physical monitoring analysis and capabilities that would encompass the climatic diversity as well as water distribution of various mountain regions of the world;

(b) Build an inventory of different forms of soils, forest, water use and crop, plant and animal genetic resources, giving priority to those under threat of extinction. Genetic resources should be protected in situ by maintaining and establishing protected areas and improving traditional farming and animal husbandry activities and establishing programmes for evaluating the potential value of the resources;

(c) Identify hazardous areas that are most vulnerable to erosion, floods, landslides, earthquakes, snow avalanches and other natural hazards;

(d) Identify mountain areas threatened by air pollution from neighbouring industrial and urban areas.

International and regional cooperation:

13. National Governments and intergovernmental organizations should:

(a) Coordinate regional and international cooperation and facilitate an exchange of information and experience among the specialized agencies, the World Bank, the International Fund for Agricultural Development (IFAD) and other international and regional organizations, national Governments, research institutions and non-governmental organizations working on mountain development;

(b) Encourage regional, national and international networking of people's initiatives and the activities of international, regional and local non-governmental organizations working on mountain development, such as the United Nations University (UNU), the Woodland Mountain Institutes (WMI), the International Center for Integrated Mountain Development (ICIMOD), the International Mountain Society (IMS), the African Mountain Association and the Andean Mountain Association, besides supporting those organizations in exchange of information and experience;

(c) Protect Fragile Mountain Ecosystem through the consideration of appropriate mechanisms including regional legal and other instruments.

Means of implementation

Financing and cost evaluation:

14. The total cost required to implement this programme area is about US$ 330 million a year, while the average annual financing required from international sources is about US$ 50 million. This includes US$ 40 million for technical cooperation and US$ 10 million for the strengthening of international institutions, particularly the United Nations Educational, Scientific and Cultural Organization, the United Nations University, the World Conservation Union (IUCN), the International Mountain Society (IMS), the Woodland Mountain Institutes (WMI) and the International Center for Integrated Mountain Development (ICIMOD), as well as the African Mountain Association and the Andean Mountain Association.

Scientific and technological means:

15. National Governments with the appropriate international and regional agencies should **(A/CONF.151/PC/WG.I/CRP.12/Rev.1, para. 14j)‹ strengthen scientific research and technological development programmes including diffusion through national and regional institutions in this field** (particularly in meteorology, hydrology, forestry, soil sciences and plant sciences).

Human resource development:

16. National Governments should:

(a) Launch training and extension programmes in environmentally appropriate technologies and practices that would be suitable to mountain ecosystems;

(b) Support higher education through fellowships and research grants for environmental studies in mountains and hill areas, particularly for candidates from indigenous mountain populations.

Capacity-building:

17. National Governments should **(A/CONF.151/PC/WG.I/CRP.12/Rev.1, para. 14e)‹ build up national and regional institutional bases that could carry research, training and dissemination of information on the sustainable development of the economies of fragile ecosystems.›**

B. PROMOTING INTEGRATED WATERSHED DEVELOPMENT AND ALTERNATIVE LIVELIHOOD OPPORTUNITIES

Basis for action

18. Nearly half of the world's population is affected in various ways by mountain ecology and the degradation of watershed areas. About 10 per cent of the Earth's population lives in mountain areas with higher slopes while about 40 per cent occupies the adjacent medium- and lower-watershed areas. There are serious problems of ecological deterioration in these watershed areas. For example, in the hillside areas of the Andean countries of South America a large portion of the farming population is now faced with a rapid deterioration of land resources. Similarly, the mountain and upland areas of the Himalayas, South-East Asia and East and Central Africa, which make vital contributions to agricultural production, are threatened by cultivation of marginal lands due to expanding population. In many areas this is accompanied by excessive livestock grazing, deforestation and loss of biomass cover.

19. Soil erosion can have a devastating impact on the vast numbers of rural people who depend on rainfed agriculture in the mountain and hillside areas. Poverty, including unemployment, poor health and bad sanitation, are widespread. Promoting integrated watershed development programmes through effective participation of local people is a key to preventing further ecological imbalance. An integrated approach is needed for conserving, upgrading and using the natural resource base of land, water, plant, animal and human resources. In addition, promoting alternative livelihood opportunities, particularly through development of employment schemes that increase the productive base, will have a significant role in improving the standard of living among the large rural population living in mountain ecosystems.

Objectives

20. By the year 2000, develop appropriate land use planning and management for both arable and non-arable land in mountain-fed watershed areas to prevent soil erosion, increase biomass production and maintain the ecological balance.

21. Promote income-generating activities such as sustainable tourism, fisheries and environmentally sound mining and improvement in infrastructure and social services, in particular to protect the livelihoods of local communities and indigenous people.

22. Develop technical and institutional arrangements for affected countries to mitigate the effects of natural disasters through hazard-prevention measures, risk zoning, early-warning systems, evacuation plans and emergency supplies.

Activities

Management-related:

23. National Governments with support of the relevant international organizations should:

(a) Undertake measures to prevent soil erosion and promote erosion-control activities in all sectors;

(b) Establish task forces or watershed development committees, complementing existing institutions, to coordinate integrated services to support local initiatives in animal husbandry, forestry, horticulture and rural development at all administrative levels;

(c) Enhance popular participation in the management of local resources through appropriate legislation;

(d) Support non-governmental organizations and other private groups assisting local organizations and communities in the preparation of projects that would enhance participatory development of local people;

(e) Provide mechanisms to preserve threatened areas that could protect wildlife, conserve biological diversity or serve as national parks;

(f) Develop national policies that would provide incentives to farmers and local people to undertake conservation measures as well as to use environment-friendly technologies;

(g) Undertake income-generating activities in cottage and agro-processing industries, such as the cultivation and processing of medicinal and aromatic plants;

(h) Undertake the above activities, taking into account the need for full participation of women, including indigenous people and local communities, in development.

Data and information:

24. National Governments should:

(a) Establish monitoring and evaluation capacities at the national, State or provincial level to generate information for daily operations as well as to assess the environmental and socio-economic impacts of projects;

(b) Generate data on alternative livelihoods and diversified production systems at the village level on annual and tree crops, livestock, poultry, beekeeping, fisheries, village industries, markets, transport and income-earning opportunities, taking fully into account the role of women and integrating them into the planning and implementation process.

International and regional cooperation:

25. National Governments, international agencies and regional organizations should:

(a) Strengthen the role of appropriate international research and training institutes of the Consultative Group on International Agricultural Research Centers (CGIAR) and the International Board for Soil Research and Management (IBSRAM) as well as regional research centres such as the Woodland Mountain Institutes and the International Center for Integrated Mountain Development in undertaking applied research relevant to watershed development;

(b) Promote regional cooperation and exchange of data and information among countries sharing the same mountain ranges and river basins, particularly those affected by mountain disasters and floods;

(c) Establish partnerships with non-governmental organizations and other private groups working in watershed development.

Means of implementation

Financial and cost evaluation:

26. Total funding required to implement this programme area is about US$ 13 billion a year, mostly from national local and private sources. Of the US$ 13 billion about US$ 1.9 billion would be needed from international sources. About US$ 1.7 billion would be related to development and about US$ 1.7 billion could be ascribed to global environmental issues. About US$ 30 million is needed for strengthening the capacity of international institutions, in particular those involved in watershed development such as the United Nations Development Programme, the Food and Agriculture Organization of the United Nations and the World Bank.

27. Financing for the promotion of alternative livelihoods in mountain ecosystems should be viewed as part of a country's anti-poverty or alternative livelihoods programme, which is also discussed in the chapters on Combating Poverty and Meeting Basic Needs and Promoting Sustainable Agriculture and Rural Development.

Scientific and technical means:

28. National Governments and local communities with the cooperation of the appropriate specialized agencies, as well as international and national research centres should:

(a) **(A/CONF.151/PC/WG.I/CRP.12/Rev.1, para. 14g)‹ Consider undertaking pilot projects that combine environmental protection and development functions with particular emphasis on some of the traditional environmental management practices/systems that have good environmental impact;›**

(b) Generate technologies for specific watershed and farm conditions through a participatory approach involving local men and women, researchers and extension agents who will carry out experiments and trials on farm conditions;

(c) Promote technologies of vegetative conservation measures for erosion prevention, in situ moisture management, improved cropping technology, fodder production and agroforestry that are low-cost, simple and easily adopted by local people.

Human resource development:

29. National Governments and local communities should:

(a) Promote a multidisciplinary and cross-sectoral approach in training and dissemination of knowledge to local people on wide-ranging issues such as household production systems, conservation and utilization of arable and non-arable land, treatment of drainage lines and recharging of groundwater, livestock management, fisheries, agroforestry and horticulture;

(b) **(A/CONF.151/PC/WG.I/CRP.12/Rev.1, para. 14f) ‹Develop human resources by providing access to education, health, energy and infrastructure;›**

(c) Promote local awareness and preparedness for disaster prevention and mitigation combined with the latest available technology for early warning and forecasting.

Capacity-building:

30. National Governments with the support of the international community should develop and strengthen national centres for watershed management to encourage a comprehensive approach to the environmental, socio-economic, technological, legislative, financial and administrative aspects and provide support to policy makers, administrators, field staff and farmers for watershed development.

31. The private sector and local communities in cooperation with national Governments should promote local infrastructure development, including communication networks, mini- or micro-hydro development to support cottage industries, and access to markets.

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LAND RESOURCES: SOIL LOSS

Text submitted by the Chairman on the basis of negotiations held on document A/CONF.151/PC/100/Add.18

Managing fragile ecosystems: sustainable mountain development
(Section II, Chapter 5, of Agenda 21)

Corrigendum

1. The beginning of paragraphs 11, 12, 15, 16, 17, 23, 24, 28, 29 and 30 should read:

Governments at the appropriate level and with the support of the relevant international and regional organizations should ...

2. Paragraphs 14 and 26 should be in square brackets.

3. Paragraph 16: add a new subparagraph reading

(c) Undertake environmental education for farmers, in particular for women, to help the rural population better understand the ecological issues regarding the sustainable development of mountain ecosystems

4. Subparagraph 24 (a)

For Establish monitoring and evaluation capacities read Maintain and establish monitoring and evaluation capicities

5. Subparagraph 25 (c)

For Establish partnerships read Maintain and establish partnerships

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LAND RESOURCES: SOIL LOSS

Text submitted by the Chairman on the basis of negotiations held on document A/CONF.151/PC/100/Add.15

Integrated approach to the planning and management of land resources

(Section II, chapter 2 of Agenda 21)

Below is the text of document A/CONF.151/PC/100/Add.15 as it has been agreed in informal negotiations on 13 March 1992. The paragraphs in the introduction, basis for action and means for implementation have not been negotiated: language on these sections will be inserted later, based on the results of ongoing consideration of cross-sectoral issues.

INTRODUCTION

1. Land is normally defined as a physical entity in terms of its topography and spatial nature; a broader integrative view also includes natural resources: the soils, minerals, water and biota that the land comprises. These components are organized in ecosystems which provide a variety of services essential to the maintenance of the integrity of life-support systems and the productive capacity of the environment. Land resources are used in ways that take advantage of all these characteristics. Land is a finite resource, while the natural resources it supports can vary over time and according to management conditions and uses. Expanding human requirements and economic activities are placing ever increasing pressures on land resources,

creating competition and conflicts and resulting in suboptimal use of both land and land resources. If, in the future, human requirements are to be met in a sustainable manner, it is now essential to resolve these conflicts and move towards more effective and efficient use of land and its natural resources. Integrated physical and land-use planning and management is an eminently practical way to achieve this. By examining all uses of land in an integrated manner, it makes it possible to minimize conflicts, to make the most efficient trade-offs and to link social and economic development with environmental protection and enhancement, thus helping to achieve the objectives of sustainable development. The essence of the integrated approach finds expression in the coordination of the sectoral planning and management activities concerned with the various aspects of land use and land resources.

2. The chapter consists of one programme, "Integrated approach to the planning and management of land resources", which deals with the reorganization and, where necessary, some strengthening of the decision-making structure, including existing policies, planning and management procedures and methods that can assist in putting in place an integrated approach to land resources. It does not deal with the operational aspects of planning and management, which are more appropriately dealt with under the relevant sectoral programmes. Since the programme deals with an important cross-sectoral aspect of decision-making for sustainable development, it is closely related to a number of other programmes that deal with that issue directly.

PROGRAMME AREA

A. INTEGRATED APPROACH TO THE PLANNING AND MANAGEMENT OF LAND RESOURCES

Basis for action

3. (Derived from para. 19) ‹Land resources are used for a variety of purposes which interact and may compete with each other; therefore it is desirable to plan and manage all uses in an integrated manner. Integration should take place at two levels, considering, on the one hand, all environmental, social and economic factors and, on the other, all environmental and resource components together (i.e., air, water, land, natural resources). Integrated consideration facilitates appropriate choices and trade offs, thus maximizing sustainable productivity and use. Opportunities to allocate land to different uses arise in the course of major settlement or development projects or in a sequential fashion as lands become available on the market›.

4. (Derived from para. 15) ‹A number of techniques, frameworks and processes can be combined to facilitate an integrated approach. They are the indispensable support for the planning and management process, at the national level, ecosystem or area levels and for the development of specific plans of action. Many of its elements are already in place, but need to be more widely

applied, further developed and strengthened›. This programme is concerned primarily with providing a framework that will coordinate decision-making; the content and operational functions are therefore not included here but are dealt with in the relevant sectoral programmes of Agenda 21.

Objectives

5. The broad objective is to facilitate allocation of land to the uses that provide the greatest sustainable benefits and to promote the transition to a sustainable and integrated management of land resources. In doing so, environmental, social and economic issues should be taken into consideration. Protected areas, private property rights, the rights of indigenous communities and the economic role of women in agriculture and rural development, among other issues, should be taken into account. In more specific terms, the objectives are to:

(a) Review and develop policies to support the best possible use of land and sustainable management of land resources, by not later than 1996;

(b) Improve and strengthen planning, management and evaluation systems for land and land resources, by not later than 2000;

(c) Strengthen institutions and coordinating mechanisms for land and land resources, by not later than 1998;

(d) Create mechanisms to facilitate the active involvement and participation of all concerned, particularly communities and people at the local level, in decision-making on land use and management, by not later than 1996.

Activities

Management-related

Develop supportive policies and policy instruments

6. Governments at the appropriate level, with the support of regional and international organizations, should ensure that policies and policy instruments support the best possible land use and sustainable management of land resources. Particular attention should be given to the role of agricultural land. To do this, they should:

(a) Develop integrated goal-setting and policy formulation at the national, regional and local levels which takes into account environmental, social, demographic and economic issues;

(b) Develop policies that encourage sustainable land use and management of land resources and take the land resource base, demographic issues and the interests of the local population into account;

(c) Review the regulatory framework, including laws, regulations and enforcement procedures, in order to identify improvements needed to support sustainable land use and management of land resources and restricts the transfer of productive arable land to other uses;

(d) Apply economic instruments and develop institutional mechanisms and incentives to encourage the best possible land use and sustainable management of land resources;

(e) Encourage the principle of delegating policy-making to the lowest level of public authority consistent with effective action and a locally driven approach.

Strengthen planning and management systems

7. Governments at the appropriate level, with the support of regional and international organizations, should review and, if appropiate, revise planning and management systems to facilitate an integrated approach. To do this, they should:

(a) Adopt planning and management systems that facilitate the integration of environmental components such as air, water, land and other natural resources, using approaches that focus on, for example, an ecosystem or a watershed;

(b) Adopt strategic frameworks that allow the integration of both developmental and environmental goals, such as sustainable livelihood systems, rural development, the World Conservation Strategy/Caring for the Earth, primary environmental care (PEC) and others;

(c) Establish a general framework for land-use and physical planning within which specialized and more detailed sectoral plans (e.g., for protected areas, agriculture, forests, human settlements, rural development) can be developed; establish intersectoral consultative bodies to streamline project planning and implementation;

(d) Strengthen management systems for land and natural resources by including apropriate traditional and indigenous methods;

(e) Examine and, if necessary, establish innovative and flexible approaches to programme funding;

(f) Compile detailed land capability inventories to guide sustainable land resources allocation, management and use at the national and local levels.

Promote application of appropriate tools for planning and management

8. Governments at the appropriate level, with the support of national and international organizations, should promote the improvement, further development and widespread application of planning and management tools that

facilitate an integrated and sustainable approach to land and resources. To do this, they should:

(a) Adopt improved systems for the interpretation and integrated analysis of data on land use and land resources;

(b) Systematically apply techniques and procedures for assessing the environmental, social and economic impacts, risks, costs and benefits of specific actions;

(c) Analyse and test methods to include land and ecosystem functions and land resources values in national accounts.

Raise awareness

9. Governments at the appropriate level, in collaboration with national institutions and interest groups and with the support of regional and international organizations, should launch awareness-raising campaigns to alert and educate people on the importance of integrated land and land resources management and the role that individuals and social groups can play in it. This should be accompanied by provision of the means to adopt improved practices for land use and sustainable management.

Promote public participation

10. Governments at the appropriate level, in collaboration with national organizations and with the support of regional and international organizations, should establish innovative procedures, programmes, projects and services that facilitate and encourage the active participation of those affected in the decision-making and implementation process, especially of groups that have, hitherto, often been excluded, such as women, youth, indigenous peoples and local communities.

Data and information

Strengthen information systems

11. Governments at the appropiate level, in collaboration with national institutions and the private sector and with the support of regional and international organizations, should strengthen the information systems necessary for making decisions and evaluating future changes on land-use and management. The needs of both men and women should be taken into account. To do this, they should:

(a) Strengthen information, monitoring and assessment systems for environmental, economic and social data related to land resources at the global, regional, national and local levels and for land capability and land-use and management patterns;

(b) Strengthen coordination between existing sectoral data systems on land and land resources and strengthen national capacity to gather and assess data;

(c) Provide the appropriate technical information necessary for informed decision-making on land use and management in an accessible form to all sectors of the population, especially to local communities and women;

(d) Support low-cost, community-managed systems for the collection of comparable information on the status and processes of change of land resources, including soils, forest cover, wildlife, climate and other elements.

International and regional coordination and cooperation

Establish regional machinery

12. National Governments, with the support of regional and international organizations, should strengthen regional cooperation and exchange of information on land resources. To do this, they should:

(a) Study and design regional policies to support programmes for land-use and physical planning;

(b) Promote the development of land-use and physical plans in the countries of the region;

(c) Design information systems and promote training;

(d) Exchange, through networks and other appropriate means, information on experiences with the process and results of integrated and participatory planning and management of land resources at the national and local levels.

Means of implementation

[Financing and cost evaluation

Sources of funds and concessional financing

13. It is assumed that most costs will be borne by Governments as part of the regular planning and management process. It is suggested that technical cooperation funding from international sources be made available at an annual cost of about US$ 50 million.]

[Scientific and technological

Enhance scientific understanding of the land resources system

14. Governments, in collaboration with the national and international scientific community and with the cooperation of appropriate national and international organizations, should promote and support research on the land

resources system and the implications for sustainable development and management practices. Priority should be given to:

(a) (Derived from para. 19.a) ‹assessment of land capability and ecosystem functions›;

(b) (Derived from para. 19.b) ‹ecosystemic interactions and interactions between land resources and social, economic and environmental systems›;

(c) (Derived from para. 19.c) ‹develop indicators of sustainability for land resources, taking into account environmental, economic, social, demographic, cultural and political factors›.]

[Test research findings through pilot projects

15. Governments, in collaboration with the national and international scientific community and cooperation of the relevant international organizations, should (derived from para. 24.a) ‹research and test, through pilot projects, the applicability of improved approaches to the integrated planning and management of land resources, including technical, social and institutional factors›.]

[Human resources development

Enhance education and training

16. Governments, in collaboration with appropriate international institutions, should promote the development of the human resources that are required to plan and manage land and land resources sustainably and:

(a) (Derived from para. 23.b) ‹emphasize interdisciplinary and integrative approaches in the curricula of schools and technical, vocational and university training›;

(b) (Derived from para. 23.d) ‹train all relevant sectors concerned to deal with land resources in an integrated and sustainable manner›;

(c) (Derived from para. 23.g) ‹train communities, relevant extension services and NGOs on land management techniques and approaches applied successfully elsewhere›.]

[Capacity-building

Strengthen technological capacity

17. Governments, in cooperation with other Governments and relevant international organizations, should promote (para. 23 and 23.e) ‹focused and concerted efforts for education and training and transfer of techniques and technologies, [including biotechnologies,] that support the various aspects of the planning and management process at the national and local levels›.]

[Strengthen institutions

18. Governments, in cooperation with appropriate international organizations, should:

(Derived from paras. 20.a, 20.e, 21.b, 23.c)

‹(a) Revise the mandates of institutions that deal with land and natural resources to include explicitly the interdisciplinary integration of environmental, social and economic issues;

(b) Strengthen coordinating mechanisms between institutions that deal with land-use and resources management to facilitate integration of sectoral concerns and strategies;

(c) Strengthen local decision-making capacity and improve coordination with higher levels.›]